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[OFFICIAL NOTICE.]

Eleventh Annual Meeting of the American Gas Light Association.

AMERICAN GAS LIGHT ASSOCIATION,
SECRETARY'S OFFICE, NEW YORK, Aug. 9, 1883.

The Eleventh Annual Meeting of the American Gas Light Association will be held in New York city on the 17th day of October, 1883, at 10 A. M., and continue for three days. Arrangements for headquarters, place of meeting, the general details are now under consideration by the Local Committee, and will be duly announced.

Members are earnestly requested to prepare papers to be read, or to present, in other form, such facts as may be of general benefit which the experiences of management may have given them.

The Association owes to itself the duty of rendering its meetings of interest and practical value, not to its members alone, but also to that growing circle of those outside of its membership who, interested in the same industry, naturally look to this Association for instruction. It is therefore of the utmost importance that evidence of our active participation in, and knowledge of, the changing conditions of our business should mark the proceedings of the Association, if its influence upon the gas industry of the country is to be of permanent value. To this end all must share in the labor incident to the work, and feel an individual interest and responsibility.

The Secretary requests members to notify him, at as early a date as possible, of the topics they may select for papers. All requests and suggestions should be addressed to the Secretary, at 94 Dearborn street, Chicago, to receive prompt attention. WM. HENRY WHITE, Secretary.

"SQUANTUM."

It has been the annual custom of the members of the Society of Gas Lighting, for some years back, to hold one of their meetings at a beautiful little place near the city of Providence, R. I., called Squantum. This is done upon the invitation of some members of the Society who are also members of the "Squantum Club." This meeting is more of a social than a business gathering of the Society, and is usually held in the month of August, probably because this seems to be the month in which perfection in the matter of getting up "clam-bakes" appears to be reached, and in the preparation of which "feasts" Rhode Island stands pre-eminent.

The members of the Society residing in the vicinity of New York city, when bent upon this trip, usually take the steamer leaving at 5 P.M. for Providence, thereby getting a beautiful sail up the Sound, an opportunity for a good supper, and a good night's rest, arriving in Providence about 5 A.M. next day. The programme usually followed out is—breakfast; then a visit to and a thorough inspection of the works of the Providence Gas Light Company, under the able care of our old friend, A. B. Slater, Esq.; next, if time will permit, attention is paid to some of the many points of interest in the city; after which the boat is boarded for the objective point proper—"Squantum."

It may be well here to give some little description of what Squantum is, what is usually done at the place, and also to say some few words in regard to its government. Squantum is situated on the Narragansett Bay, about 5 miles distant from Providence, on a rocky promontory or headland project-

ing out into the Bay, with the water washing it on three sides, thus making it a most beautiful spot for purposes of pleasure and recreation. Upon this property the "Squantum Club" have erected suitable buildings for the comfort and convenience of those visiting the place. It can be easily reached, either by boat or rail, at almost any hour of the day, in about half an hour's time from Providence. On all days of the week, with the exception of Wednesday, which is known as "Club Day," the use of the place is reserved exclusively for members and their families (including the "dearly beloved," who are expected at some date to assume the duties of wives, and thus come into the family), who order whatever they may want to eat, either for luncheon or dinner, and enjoy themselves in any manner not inconsistent with the rules laid down for the proper government of the place. These rules are at all times strictly enforced by the management, which consists of a president and board of directors, these being elected by the stockholders of the club. They have entire supervision of everything, and also the care of all guests who may visit the place.

The usual programme for Wednesday, or "Club Day," as it is called, is to serve, at 1 o'clock P. M., a dinner free to members. This dinner consists of all kinds of fish obtainable, and cooked in every conceivable way, either boiled, broiled, fried, or made up into a delectable article of chowder. The fish is served with the accompaniment of every vegetable in season; and, truly, this makes a solid and substantial meal, sure to be appreciated by all fortunate enough to participate in the eating thereof, and certain to be successful in satisfying the "cravings of hungry humanity." There is something peculiar about this place in the matter of creating an appetite; whether it is in the air, or in the cooking, but more likely to be attributed to both causes, everyone who visits here is always prepared to do full justice to the edibles. The dinner mentioned above is considered as only a preliminary, or sort of skirmish, to the general attack expected to take place "all along the line" upon the "clam-bake," "line of battle" for which is usually "formed" at 5 P. M. It is simply impossible to properly describe "Rhode Island clam-bakes," and the only way to get at their "true inwardness" is to participate in one gotten up at "Squantum." One remark, in regard to the cooking, may be here made, and that is the "firing" appears to be carried out on what might be termed the recuperative rather than the regenerative system.

We have heard some marvelous stories as to the feats performed by individuals in disposing of the delicious viands served up at these "clam-bakes;" and although we are not prepared to vouch for all the statements made, yet what we have seen done in the way of eating on these "auspicious occasions" would appear incredible to any other than an eye-witness.

The Society of Gas Lighting visited Squantum, on their annual trip, on Wednesday, August 15. The thanks of the Society are due, and are hereby tendered, to the members of the Squantum Club for the uniform courtesy and kind attention always manifested towards their visitors, and the apparent desire to make the same feel thoroughly at home in the annual visit to this charming little place.

MANCHESTER (N. H.) GAS WORKS.

On a late visit to the Eastern States we had the pleasure of calling upon our esteemed friend L. P. Gerould, Esq., agent and general manager of the Manchester Gas Light Company, Manchester, N. H.

The city of Manchester is situated on the banks of the Merrimack river, from which source is obtained the power for driving the machinery contained in the mills operated there, and for which the city is noted. These mills are chiefly engaged in the manufacture of cotton goods, furnishing employment to the greater part of the population of the place, and making Manchester a busy and thriving spot.

The gas works, to which we wish to call attention, are situated alongside of the railroad running from Nashua to Concord. This road connects with other roads running in almost every direction; thus affording the company the best of facilities for obtaining coal at any season of the year. The works, of which a large portion was lately rebuilt, consist of a retort house 60′ × 90′, containing 12 benches of sixes, fitted with the excelsior dip valve and the McIlhenny mouthpiece and lids. The exhauster room, 25′ × 28′, is beautifully finished in hard wood, and contains two of the Smith & Sayre Manufacturing Company's exhausters, each of a capacity of 40,000 cubic feet per hour. There are also two horizontal engines, so arranged that either engine or exhauster can be run at any time. The condenser room is 20′ × 35′, and is fitted up with eight upright condensers, and two scrubbers 15 feet in height. These condensers and scrubbers are furnished with valves, and can be run in one or two sections, as may be desired. They have a daily maximum capacity of 500,000 cubic feet. The boiler room, the dimensions of which are 20′ × 35′, contains two boilers—one horizontal and one upright—capable of furnishing steam for all purposes about the works. The purifying room is 36′ × 92′, and contains four purifiers 16′ × 24′. These purifiers are set in one row, and a carriage, running upon the floor, raises either of the lids. The cellar under the room is very light and airy, being 10 feet in the clear. The purifiers, instead of being connected in the old-fashioned way with a center seal, are connected with a series of pipes and valves, 21 in all, and can be worked in any manner—either the whole four at one time, or any one, or more, thrown out at pleasure. All the valves and connections about the purifiers are 16″ diameter. This work was manufactured and set up by the Davis & Farnum Manufacturing Company, and is very creditable to them.

There are three gasholders at the works, and one about 1½ miles distant. These holders have a storage capacity of about 600,000 cubic feet. Taken as a whole, the establishment is as fine a one as we wish to look at; and we congratulate friend Gerould that everything about the works is in such good condition, and so well arranged to perform the work required.

A Sensible Mayor.

Attention is called to the veto message of Mr. John B. Manning, Mayor of Buffalo, New York, the full report of which will be found elsewhere in this number of the JOURNAL. The proposition of the Commom Council, whereby it was considered expedient to introduce the system of arc lighting in the streets of the city, to the almost entire exclusion of gas, must have been of a particularly pleasing nature to the taxpayers of a community, who doubtlessly find themselves sufficiently taxed already. Could it even have been shown that the increased expenditure would result in some approximate increase of the value of the street lighting service the Councilmen might have some slight excuse for their proposed extravagance. Mayor Manning shows, by a very simple exposition, that the city of Buffalo would be a loser to the extent annually of $30,461, if the terms of the proposed "new deal" were carried into effect; but, as sometimes happens, the right man is found in the right place, and Mayor Manning, by his action, has probably given this project its quietus. One of the richest parts of the scheme is that which is so clearly exposed in the words of the veto message, "With few exceptions these are outlying streets, mostly in very thinly populated districts, and some of them being hardly more than country roads. Yet you propose to light all these at a rate of expense more than double that of lighting the most densely populated portions of the city." This, of course, refers to only a portion of the territory to be lighted.

The Petroleum Outlook.

The situation in general, while not materially changed, is such that the passage of another month has added to its interesting features. Prominent among these is the fact that Pipe Line daily average runs more nearly represent the actual production than before; that is, runs from the wells and shipments approximate each other within a few hundred barrels. This amount is now in round numbers 65,000 barrels daily. With the increased shipments which this season must engender, the stocks in tank must show a decline. In fact this element came to the surface in the United Pipe Line's report for July, given elsewhere.

The thirty days which have elapsed since the last issue of this journal, has failed to increase materially the area of new territory. In the Balltown district, however, several wells have been developed whose yield is larger than any struck since the Cherry Grove field was opened. These may do more than atone for the falling off in the yield of Cooper Tract wells and those of other and older fields, but it does not seem certain that production will not decrease slowly nevertheless.

Refined ruled low during July, but at present writing is subject to an advance, based on the statement that the Tidewater Pipe Line has become the property of the United Line.

The condition of stocks abroad is favorable to higher prices in the near future. Guttentag's report of July 28, gives these stocks (refined) in all European ports and London, at 2,411,323 barrels in 1882, and 2,597,221 barrels in 1883, or an excess in the year of only 185,898 barrels. This includes stocks in warehouses, afloat and unloading.

Summed up, the situation favors neither producer or consumer, as is shown in the prevailing steadiness of the price of crude. This is in the face of unusual speculative flurries and commercial disturbance. The average price for August to date has been $1.05⅞ per barrel of crude at the wells of the producer.

At present writing, (Aug. 20) the trade is somewhat interested in renewed rumors to the effect the United Pipe Lines had completed negotiations looking to the consolidation of the Tidewater Line with the United. An advance in the price of refined at New York and other features of the trade gave color to the rumors. Inasmuch as the officers of both lines deny that any such consolidation has been effected, these rumors go the way of similar stories that have come to the surface from time to time. That efforts have been, and are being made to effect this consolidation is however pretty certain, and the final result will possess considerable importance for the trade. —*Stowell's Petroleum Reporter.*

The Desirability of Gas Companies and Corporations Letting Out Gas Stoves on Hire.

[At the 22d Annual General Meeting of the North British Association of Gas Managers, Mr. J. McCrae, of Dundee, read the following paper on "The Desirability of Gas Companies and Corporations Letting Out Gas Stoves on Hire." The paper is reprinted from the report of the proceedings, as given in the London *Journal of Gas Lighting*.]

It must seem somewhat strange that I should appear before you to-day advocating the introduction in Scotland of a scheme which is already an old and established one in England. And this must be all the more mysterious when we remember that the results of the plan, as carried out in the South, have been so universally successful. The question, therefore, very reasonably presents itself—Why is it that we in Scotland have not, long ere this, followed the example of our friends in the South? Gas managers, as a rule, are a most ambitious class—zealous always for the success of the undertakings over which they are placed, and seldom failing to benefit either by their own experience or that of their fellow-craftsmen, or (what is perhaps best of all) both. But here there seems to be a grand exception to the rule. Nearly all the companies or corporations in England have, as I have already stated, introduced gas stoves; whereas, so far as my knowledge goes, not one company or corporation in Scotland had reduced the question to actual practice, or even made the experiment, until the Dundee Gas Commissioners began the work quite a year ago.

The reasons why we, on this side of the Tweed, have been so slow in this matter are not quite obvious; but it seems to me that two great causes have operated against us, and these are, in the first place, the fact that the Scottish people, as a rule, have not a very fastidious taste in matters connected with the culinary art; and, in the next, because hitherto the price of gas in Scotland generally has been such that the consumers considered the less they used the better. Whether the former of these difficulties has been or is being removed, is, of course, out of my province to day; but the latter objection is, without question, gradually disappearing. This being so, I consider the matter may at the present time be fairly laid before our consumers, believing, as I do, that the benefits to be gained will be mutual.

In Dundee, about a year and a half ago, after having been in communication with the principal companies and corporations in England, my Commissioners agreed that a fair trial of the scheme should be made; and accordingly a room at the gas works was fitted up as a show-room, where a very good and extensive assortment of stoves were displayed. The results were quite disappointing. Very few of the public visited our show-room; and had our exertions ended there, I verily believe the whole project would have been dead and buried long ago.

The cause of this failure, however, it was not difficult to discover. Our show-room was too far from the center of the town. If, therefore, the public would not come to our stoves, we determined that the stoves should be taken to them. Accordingly, a shop was rented in a central street, and fitted up as a show-room. A circular was prepared and distributed, and we began our work in earnest. The show-room contained a good selection of cooking-stoves suited to all classes of consumers, also many heating-stoves and boiling-rings, and generally any stove the utility of which, in our opinion, would be appreciated by the public. Many gas consumers visited our exhibition, and were evidently much interested in all they saw. The scheme was advertised in the daily Press; and, indeed, nothing was left undone which were likely to popularize our movement.

We continued doing a pretty steady business all through last winter. But still believing we had a greater work to accomplish, we rented a larger and more important shop in one of the principal streets of Dundee; and this last step will, I am sure, prove to be the best and wisest we have yet taken. Simultaneously with this, the writer prepared a simple pamphlet, pointing out the advantages to the consumer of using gas stoves, and containing copies of testimonials from those persons in Dundee who had experienced the benefits which we were anxious should be more widespread. Here I would just say a word to gas managers who may be contemplating beginning to experiment in the direction I have indicated. By all means make your arrangements of such a nature as will cause the public the least inconvenience, trouble, and expense. We are the promoters, and must exert ourselves to suit the requirements of those who are to use the gas we are so anxious to sell. Enacting severe bye-laws—such as compelling the consumer to retain the stove for any given time—levying exorbitant rents, or charging high prices for the connection of the stoves, are all most effectual means of crippling and crushing the whole scheme.

The rents to be charged for the use of the stoves were most carefully considered by us, and we came to the conclusion that if we received 10 per cent. per annum on the list price of each stove, the public would be satisfied, and our expenses would be covered. Of course for this rent it is understood that we keep the stove in a state of repair, and generally have such supervision over it as will ensure its good working. These rents are collected with the gas accounts. For stoves sold we allow 10 per cent. discount off the price list. Stoves under the value of one guinea must be purchased by the consumer.

One difficulty will probably present itself—namely, the want of pressure in the daytime during the summer; but it is only a question for the manager to decide at what point it will pay him to increase the pressure. Last year our pressure during the day was 8-10ths, and complaints were numerous; but, in the meantime, we were extending our business until it arrived at the point where I considered we were justified in increasing the pressure, which I did to 10-10ths, and after this all complaint ceased. These and many other details must be considered and decided by the manager, when the case requires it; but in the matter of pressure, if 8-10ths can be ensured at the stove it will be found ample.

I now come to a most important part of my paper, which deals with the kind of stove that, in my opinion, is best adapted alike for the consumer and for the company or corporation letting it out. This, I know, is very delicate ground, from the fact that so many excellent gas stoves are at present before the public; and the number is almost daily increasing. In deciding such a question as this, it is frequently the case that the firm whose stove has found least favor with the public rush to hasty and premature conclusions, generally condemning the judgment of the person who selects the stove. On the whole, my experience in the gas stove department points to the fact that the public are pretty good judges of what constitutes a good and serviceable stove; and, in making their selection, it is quite safe to leave them entirely to the freedom of their own will.

When we opened our first show-room, we included in our selection stoves from one English firm—good articles of their kind, well made, and economical. But it was strange—almost marvellous—that scarcely one of them found favor in the eyes of the people of Dundee. The other stove we exhibited was Waddell and Main's, than which, in my opinion, no better stove exists at the present moment. The stoves from this firm (which, as you know, consume pure gas) took readily with the public, and have in every case given the most complete satisfaction. It must be gratifying to the firm to know (and I have never told them before) that out of the hundreds of their stoves we have fixed under most varying conditions, not one of them has up to now been returned as defective or insufficient.

The English stove I referred to was one heated on the Bunsen principle; and here, again, lies a very formidable bone of contention. "Is it to be pure gas or atmospheric burners?" I could enter into this question very fully; but I feel that the matter was so ably treated by Dr. Macadam last year, that it would simply be wasting your time to go over the same ground. One or two points, however, present themselves to me; and these, I think, may be of interest to you. You may remember that last year Dr. Macadam compared the pure gas stove of one firm with the atmospheric gas stove of another firm; and, having gone faithfully into the merits of each, he gave the ribbon to the pure gas stove.

While this opinion was, in my judgment, just and fair, it occurs to me that the test was useful only to the extent of proving which firm supplied the most suitable and economical stove, and did not go to the length of establishing a principle that pure gas was the best cooking agent under all conditions. The stoves themselves might vary in their structural fitness to do the work required of them. One stove might be but inferiorly jacketed; another might have its burners much out of proportion to its capacity; in another the door might fit loosely; and in another the ventilation might be too easy. Many causes are quite likely to creep in which would render the stoves incapable of being fairly compared one with the other. This being so, I think you will admit that to have a fair trial between pure gas and atmospheric burners, two stoves should be selected which are in every respect similar, except in the one essential of the burners. This I have done. The stove selected was Waddell and Main's No. 3 Universal Domestic; believing as I did that a cooking experiment would be the simplest, and at the same time most satisfactory and conclusive. The stoves were both carefully fitted, and were perfectly alike, even to the smallest detail. The following were the results:

	Weight of Meat put in.	Time in Heating up.	Total Time occupied.	Weight of Meat when taken out.	Loss in Weight.	Consumption of Gas.
	lbs. oz.	min.	h. m.	lbs.	oz.	cu. ft.
Pure gas.....	6 7	8	1 30	6	7	10.40
Bunsen	6 7	8	1 50	6	7	12.50

Illuminating power of gas, 26.5 candles.

I may add that the joints selected were cut from the same animal, and

were as nearly as possible similar; and they were well cooked in both cases. I have therefore no hesitation in stating that the experiment may be considered a fair one, conducted as it was with the greatest care and accuracy. It thus appears that the Bunsen burner does not possess any peculiar advantage over the pure gas burner for cooking purposes, but rather the reverse.

There are, however, several reasons, independent of the monetary one, which are strong arguments in favor of the pure-gas system. There is no risk of "firing back," as the Bunsen is so liable to do if the door of the oven is closed suddenly. One case came under my own notice, where the cook closed the oven door hurriedly, which caused the gas to ignite at the mixer, and, the stove standing near the woodwork of the house, the latter soon became ignited. Fortunately the fire was discovered before it had attained much hold; but this one instance is sufficient to show the possibility of accident. Another great objection to the Bunsen system is the offensive odor given off when the burners are lighted. This would not be of very great moment if the stove were placed in a fireplace or in connection with a chimney; but in Dundee, where most of the stoves are simply placed on the kitchen floor or on a side table, the Bunsen system, I feel sure, would be a constant and intolerable nuisance.

It has often struck me as being curious that different stoves are sent out by different makers with Bunsen burners of their own peculiar design, and seemingly without any rule or theory by which they were guided in their construction; and it occurred to me that it would be interesting to know the percentages of air and gas which would yield the highest results for heating purposes. To ascertain this I made a cylindrical vessel, near the bottom of which (and at the same level) were placed the burners to be experimented upon. In the top of the vessel was left a hole, into which was placed a vessel containing a measured quantity of water of a known temperature. A thermometer was conveniently placed, so that the rise in temperature of the water might be accurately observed. The following were the results:

Quantity water experimented with.	Temperature of Water at beginning of test	Quantity of Gas.	Quantity of Air	Temperature of Water at end of test.	Duration of Experiment.	Increase of Temperature.
lbs.	Degrees F.	cu. ft.	cu. ft.	Degrees F.	min.	Degrees F.
2	64	5	.....	180	60	116
2	64	5	5	182	60	118
2	64	5	10	182	60	118
2	64	5	15	180	60	116
2	64	5	20	178	60	114
2	64	5	25	178	60	114

Illuminating power of gas, 26.5 candles.

From this it is quite evident that the Bunsen principle may be carried too far, when the quantity of air drawn down into the flame reduces the temperature of the carbon, and prevents that complete combustion which otherwise is attainable. But the question may very reasonably be asked, "How is it you tell us the temperature of the Bunsen flame is the highest, yet in the cooking experiment, bearing in mind the quantity of gas consumed, it did not do its work so rapidly as the pure gas?" This question is not easily answered, because we should expect that, in the oven where the highest heat was generated, the cooking would be effected most rapidly. The fact is, in the cooking experiment, the meat in the pure-gas oven began much earlier to show signs of being cooked than in the Bunsen oven; and my theory is this: In the latter oven, the high heat forms, as it were, a crust round the meat, and being a dry and partially non-conducting crust, the heat takes considerable time to penetrate the mass. In the meantime, in consequence of the meat not absorbing the heat, the temperature in the oven rises; and this is exactly what occurred, from the thermometric observations which were taken during the experiment. In the pure-gas oven, where the heat is moist and radiates better, the cooking begins almost immediately the heat has reached a cooking temperature; and the juices being retained in the meat, the heat with ease permeates the whole mass. This is one explanation of the results obtained, which may be considered fairly satisfactory.

A question of much interest arises here, and it is this: Whether rich or poor gas is the better suited for cooking and heating. We have frequently heard it stated that our Scotch gas is not suited for such purposes, and that the poorer the gas the better it is for consumption in stoves. My experience is entirely opposed to this idea; and, as will be seen, demonstrates most clearly that the statement has no existence in fact. When any uncertain theory is propounded, or wild statement made, reduce the question to actual experiment, and the truth will undoubtedly be elicited and established. My experiments in connection with this subject have been made simply with the view of arriving at the truth; and consequently, in comparing the work performed by the two qualities of gas, the conditions of consumption, the apparatus by which the comparison was to be made, and the circumstances attending the experiments generally, have, as nearly as possible, been exactly alike. I made the first experiment with the water; and the following were the results:

Quantity Water experimented with.	Temperature of Water at beginning of test	Quantity of Gas	Quantity of Air	Temperature of Water at end of test.	Duration of Experiment.	Increase of Temperature.
lbs.	Degrees F.	cu. ft.	cu. ft.	Degrees F.	min.	Degrees F.
2	64	5	.....	160	60	96
2	64	5	5	168	60	104
2	64	5	10	168	60	104
2	64	5	15	166	60	102
2	64	5	20	162	60	98
2	64	5	25	160	60	96

Illuminating power of gas, 15.5 candles.

If you compared these results with those obtained by using the 26.5-candle gas, you will see at once that the richer gas is by far the better agent for heating purposes.

To ascertain whether the superiority of the rich gas would hold good under more general and every-day conditions, I repeated the cooking experiments, substituting the 15½ for the 26½ candle gas. Here, again, every detail was so arranged that a fair comparison might be instituted; and the results were as follows:

	Weight of Meat put in.	Time in Heating up.	Total time occupied.	Weight of Meat when taken out.	Loss in Weight.	Consumption of Gas.
	lbs. oz.	min.	h. m.	lbs. oz.	oz.	cu. ft.
Pure gas.....	6 7	5	1 45	5 9½	13½	14.50
Bunsen	6 7	5	1 45	5 12½	10½	16.00

Illuminating power of gas, 15.5 candles.
The meat was in each case fairly well done.

It seems to me, when we examine these details, that no doubt can exist in our minds that Scotch gas is not only equal, but very much superior (for the purposes I have named) to the gas generally manufactured by our friends in the South. This being so, what obstacle can there be to the general—I might say the universal adoption of gas stoves in Scotland? Every article is in our favor; and I am decidedly of opinion that the matter has simply to be plainly put before the public by the various gas managers, and a hearty response is certain to be received. In these days, when there is everywhere heard the cry for pure air and more of it, surely it is a fitting time for us to lay before the public the advantages attending the use of our gaseous fuel; and even taking this philanthropic view of the case, there will be some little credit due to us for contributing, in our own small way, to the grand ultimate results, which will undoubtedly come to pass, when our towns shall be smokeless, and the dustbin and all its concomitants will be spoken of as matters of history and antiquity.

But there are reasons in favor of this gas stove movement which appeal to us as gas managers far more forcibly that the one I have just given. Are we not told, by men whose opinions on the subject should be valuable, that gas, as an illuminant, will—and that very shortly—have but a second place, and the prosperity which has hitherto attended the manufacture and sale of gas must be transferred to its more brilliant and wholesome opponent, electricity? Whether or not the rays from this new light have been too intense—disturbing to some extent that equilibrium which is said to exist in every well-balanced mind, and rendering the above prophecy at least somewhat premature—I cannot tell; but, without admitting the necessity for writing "Ichabod" over our gas works' gates, we should bestir ourselves in ensuring the fact that if our gas is not much longer to be required for light-giving purposes, a great demand for it shall be created for heating and cooking.

It is patent to every one that the greater the quantity of gas manufactured, the cheaper it can be produced; but the truth of this statement is rendered much more valuable when we remember that the increase in consumption caused by gas stoves is taking place chiefly during the summer season. Every gas manager must, when he looks around him during the long days, feel that a great loss is going on when three-fourths of his plant is lying perfectly idle—plant upon which he is paying dividend, and which he must uphold and keep in a state of repair. It surely, then, becomes a duty for us to

increase the summer consumption, and so make this idle plant more remunerative. Every thousand feet of gas we can sell without adding anything to our capital expenditure must be a commendable and wise step. And this is the most powerful argument in favor of letting on hire gas stoves for cooking and heating.

It is almost surprising how large a quantity of gas can be disposed of after a movement such as I have advocated has been fairly set on foot. I have had many of our consumers' accounts examined and compared where gas stoves were in use, and I found different consumers' consumptions with the same stove to be very close indeed. To enable us to arrive pretty accurately at the quantity of gas consumed by the various stoves (in actual practice), we compared the consumption for the year when the stove was at work, with the previous year when the gas used was for lighting purposes only. The following statement gives the full particulars of our examination:

Stoves on Hire, June 19, 1883.

Kind of Stove.	Number of Stoves on Hire.	Gas Consumed by each Stove. Cubic Feet.	Total Consumption. Cubic Feet.
Waddell and Main's—			
No. 4 Universal Domestic	8	25,000	200,000
No. 3 " "	72	17,500	1,260,000
No. 2 " "	98	15,600	1,528,800
No. 1 " "	15	(say) 10,000	150,000
No. 3 and boiler	2	(say) 17,500	35,000
The Cottage	1	(say) 10,000	10,000
No. 2 Lux Calor	32	9,400	300,800
No. 1 "	30	4,500	135,000
Argyle heater	21	3,000	63,000
Bath heater	8	4,800	38,400
Water heater	9	3,000	27,000
Oven and tray	1	(say) 17,000	17,000
Gas fumes stove	6	3,000	18,000
B No. 492 Eureka	1	(say) 18,000	18,000
Total	304	—	3,801,000

Stoves Sold, June 19, 1883.

Kind of Stove.	Number of Stoves in Use.
No. 3 Universal Domestic	1
No. 2 " "	2
No. B 912 hot-plate	4
Baker's hot-plate	1
Gas tables	2
No. D 2 Lux Calor	1
Iron heater	2
The Bachelor	9
Déposé	6
No. 47 solid-flame burners	27
No. 51 " "	74
Radial burners	37
Automaton blowpipe	1
Iron girdle	1
Circular broiler	1
Wright's solid-flame burner	12
Platina fire	22
Cosey fire	26
Water heater	2
Total	231

From the foregoing statement it appears that supposing all the stoves out on hire on the 19th of June were at work for one year (as most of them have been), the quantity of gas consumed would be 3,801,000 cubic feet. We had sold up to the 19th of June 231 stoves, consisting chiefly of Fletcher's various solid-flame burners, together with gas-fires from different makers. Averaging these at 6,000 cubic feet each per annum, we increase the quantity of gas sold by 1,386,000 cubic feet; and this added to the above figure gives us a total of 5,187,000 cubic feet per annum sold for purposes of cooking and heating, which I consider very encouraging. That we shall continue to improve in the gas stove department I have little doubt. New and improved appliances continue to be brought out, and these undoubtedly will assist greatly in popularizing the movement.

And now, gentlemen, my subject, so far I can enter upon it at present, is nearly exhausted. I have tried to indicate a popular means for increasing the sale of gas; and I have also tried to clear up one or two doubtful points in regard to different forms of burners. I feel that the manner in which I have treated the subject is neither so full nor so elaborate as I should wish, nor, doubtless, as you had expected; but probably a few subjects have been opened up, which may be followed out by some other member, and thus my paper will not have been quite valueless. The desirability of bringing about all I have suggested is, to my mind, very obvious, and I know of no means by which the end can be attained other than those indicated. We hear sometimes the statement that letting out stoves on hire ought to be discountenanced, and only sales should be effected. Well, if it were possible to make any headway by selling stoves, it would certainly be the cause of much less anxiety and trouble to a manager; but I feel quite certain that, in Scotland at any rate, a business will never be done by selling stoves. How can we expect a man to purchase a stove regarding the usefulness of which he has simply no idea? For one person you will meet who is ready to run the risk (for they will consider it such) of purchasing a stove, fifty will be found prepared to try a stove for a quarter.

[From the Review of Gas and Water Engineering.]

Three Different Methods of Sulphur Purification.

By F. Livesey.

[A Paper read at the Sheffield Meeting of the Gas Institute.]

Sulphur purification is a somewhat troublesome process, to those even who have had much experience of it. It is easy enough when thoroughly mastered, and plentifully provided with purifiers of sufficient area; but yet it is a process that always requires watching, and is subject to total disarrangement by a little inattention. It is curious that, while the main principles are agreed upon, the plans in use for carrying them out are many and various; in fact, it may be said that there are scarcely two alike. The writer has had occasion to investigate three of the many different methods of purification, in order to discover the most economical plan, and has thought that the subject might be interesting to the Institute, more especially as the transactions are somewhat wanting in this matter.

A plan recommended some few years ago was to have three sets of purifiers; two of them being lime to remove carbonic acid, followed by a set of boxes to remove sulphuretted hydrogen and the sulphur compounds, and with oxide at the finish to remove the last traces of sulphuretted hydrogen. Later on oxide was introduced, in some cases before the carbonic acid boxes, and in others after, with the object of taking up the sulphuretted hydrogen, and so giving less work for the lime.

First Method.—The first process to be described is as follows: Two oxide purifiers for sulphuretted hydrogen, two lime purifiers for carbonic acid, four purifiers charged with lime for the sulphur compounds, and two catch oxide boxes to finish with. There are ten purifiers in all, though probably eight would do the work required. The two oxide purifiers are sometimes bye-passed, to properly prepare the lime for the sulphur compounds; but they are generally at work, and besides removing sulphuretted hydrogen they also reduce the sulphur by about 3 grains—sometimes as much as 4, seldom less than 2 grains. It is not necessary for the carbonic acid boxes to entirely remove this impurity, as sometimes as much as ¼ per cent. goes forward. They also do their part in removing sulphur, taking out another 3 grains, making a total of 6 grains, before the gas enters the sulphur boxes proper.

An average representative condition of the gas on leaving these vessels may be taken as follows:

The first sulphide box removes	2.1 grs. per 100 ft.
The second " "	1.2 "
The third " "	6.7 "
The fourth " "	5.4 "
Total	15.4 grs. per 100 ft.
The carbonic acid and first oxide purifiers remove	6.0 "
Making a grand total of	21.4 grs. per 100 ft.

This would reduce the sulphur below the limits prescribed by the Referees.

The sulphide boxes are worked in this manner: When the first box in the series is doing but little work, or possibly it may be expedient to work it until sulphur is given off, the lime is taken out, placed in a heap, allowed to heat, and then returned. The portion carbonated, and consequently devoid of heat, is rejected and new lime put in its place. It is then placed last in the series of four, and immediately comes into active work, removing from 5 to 8 grains of the sulphur compounds. It sometimes happens that a box not first in the series requires changing. In such case it can still be kept in the same relative position if necessary. When the heated lime is placed in the last box, a large quantity of sulphuretted hydrogen is driven forward into the catch purifiers; and consequently if two only are used it is necessary to watch them carefully.

This is the most economical plan of those to be described. The quantity of lime used being small, though the labor is rather heavy, and a large number of purifiers are required to work it.

Second Method.—The second method is that where Hill's liquor purification is in use. By this plan the gas, after leaving the exhauster, is thor-

oughly washed with the purified liquor, which removes nearly the whole of the carbonic acid, and a considerable quantity of the sulphuretted hydrogen. The gas then passes through three lime boxes worked in rotation, which reduce the sulphur compounds to the limits required, and at the same time remove the bulk of the sulphuretted hydrogen. The usual oxide purifiers (three in number) finish up the process.

A normal state of the purifiers would be represented thus—

	No. 1.—Lime.	No. 2.—Lime.	No. 3.—Lime.
CO_2	*nil*	*nil*	*nil*
CS_2, grains per 100 feet	32	28	11
SH_2, " "	over 500	over 500	*nil*

The point to be noticed in this normal condition is that while there is a plentiful supply of sulphuretted hydrogen showing through the second lime box, no carbonic acid shows at the outlet of the first. The bulk of the work in this case is done by the third box, 17 grains of sulphur being removed.

When a change is required, the condition of purifiers would be as follows:

	No. 1.—Lime.	No. 2.—Lime.	No. 3.—Lime.
CO_2	2 per cent.	*nil*	*nil*
CS_2, grains per 100 feet	31	27	14
SH_2, " "	over 500	over 500	35

After the change the tests would show—

	No. 1.—Lime.	No. 2.—Lime.	No. 3—Lime.
CO_2	*nil*	*nil*	*nil*
CS_2, grains per 100 feet	25	14	11
SH_2, " "	over 500	33.3	*nil*

Here it will be noticed that the second box is doing the greater portion of the sulphur purification—removing 11 grains.

The rules adopted for changing are that when the first purifier shows above 33 grains of sulphur, or when the carbonic acid is above 0.22 per cent., a change is required. It is also a rule that the carbonic acid must never show through the second vessel. The advantages to be gained by this plan are the small number of purifiers required—six, or even five, being sufficient to work the process. The quantity of lime used is small in proportion, and the labor also is not heavy. One yard of unslaked lime purifies the gas made from 35 to 40 tons of coal.

In this manner of purification care must be taken to supply the proper quantity of purified liquor. If too much is supplied there will not be sufficient sulphuretted hydrogen to keep the lime boxes in working order, and if too little is used, due advantage is not obtained from the process as an aid to purification, and the carbonic acid rapidly increases. Oxide purifiers placed in front of the lime only render the plan more difficult of management, causing a deficiency in sulphuretted hydrogen, as in the case of using an exces of purified liquor just mentioned.

Third Method.—In the third process the gas, after passing through a washer and two scrubbers, first enters a set of four purifiers, three of which are at work, one of them being oxide (which is always first in the series) and two lime. Each purifier when changed is always charged with a different material to that taken out. A lime becomes an oxide, and is placed first in the series; an oxide becomes a lime, and is placed last. The purifiers are worked in rotation, but the valves are so arranged that any one in the series can be bye-passed at any time.

After leaving the purifiers the gas passes into sometimes one, sometimes two calcium sulphide boxes, which remove another 3 to 5 grains, and continue to do this for five or six months. The first oxide purifier removes about 2 grains of the sulphur compounds, the first lime purifier about the same, the second lime from 4 to 6 grains, and the sulphide box another 3 grains. These figures are for the month of December—the worst month in the year. In summer the purifiers would do more work.

A nominal condition of impurities at the outlets of the boxes would be as follows:

	No. 1. Oxide Box.	No. 2. Lime Box.	No. 4. Sulphide Box.
CO_2	0.28 per ct.	traces	*nil*
CS_2, grains per 100 feet	25.2	22.7	14.6
SH_2, " "	313.0	94.0	*nil*

	Clean Lime.	No. 3. Lime Box.
CO_2	Not at work.	*nil*
CS_2, grains per 100 feet	"	16.6
SH_2, " "	"	0.5

Experience in working this process shows that the oxide placed first in the series is an essential element of success, and that without it there is an excess of sulphuretted hydrogen necessary for the proper working of the lime. On the other hand, in the process previously described, an oxide purifier, placed first in the series, was found greatly to increase the difficulties of purification by removing too great a quantity of sulphuretted hydrogen.

A comparison between the different methods will show that the most costly is the third method described; and it will be found that both in lime and labor the cost is heavy, caused by the insufficient number of boxes in the series, and those of too limited area. The total cost is 7.10d. per ton of coal, made up as follows:—3.31d. for lime, 2.88d. for labor, and 0.91d. for removing the lime; but for a more just comparison it would be better to take out the latter item, making the total 6.19d. In the second plan of working—that where Hill's liquor is employed—the labor is low, but the fuel and labor on the liquor purification add 1.58d. per ton of coal. The total cost is here 6.23d. per ton of coal. Taking out the item for the removal of the lime, the total would be 5.52d. per ton. The first plan described has the largest number of vessels in the series, and this proves to be the most economical. The cost of lime is 2.15d. per ton of coal, and consequently the item for removing the lime is also low. The total cost is 5.23d. per ton, or, without removing the lime, 4.84d. per ton; showing a saving of 1.35d. per ton over the most expensive plan. Comparing the cost of purification with the area in use, it will be found, as might be expected, that the largest area gives the best results, allowing a slower speed for the gas through the purifier.

In designing purifying plant, the first point to be settled is the amount of purification required. Are the sulphur compounds and carbonic acid to be removed, or is merely sulphuretted hydrogen to be considered? If the latter plan is adopted, no description is required; but if the former, some of the many plans in use must be chosen.

The following are some of the many plans in use:

(1)

2 oxide vessels for	SH_2
2 lime "	CO_2
2 or 3 lime "	CS_2
2 oxide "	SH_2
8 or 9	

(2)

2 lime vessels for	CO_2
2 or 3 lime	CS_2
2 oxide	SH_2
6 or 7	

(3)

1 oxide for	SH_2
4 lime for	CO_2 & CS_2
2 oxide for	SH_2
7	

(4)

Liquor to remove	CO_2
3 lime for	CS_2
2 oxide for	SH_2
5	

(5)

Lime in four purifiers, worked in rotation, of a large area, to remove CO_2, CS_2, and SH_2.

By these different plans there may be as many as nine, or as small a number as three purifiers in use. The important question of area next requires decision. By this is meant the superficial area of one vessel in the series. This will be found to vary considerably. Take, for instance, a case quoted by Mr. Anderson in his paper read before the British Association of Gas Managers in June, 1874, where only 1,250 feet of gas was passed through each superficial foot; or Mr. Newbigging's rule (maximum 24 hours' make in thousands × .6 for superficial area of each purifier), which gives 1,666 feet of gas to pass through per superficial foot of each of the purifiers, and compare this with the three cases now described; No. 1 being 3,200 feet of gas, with nine purifiers in the series; No. 2, 3,304 feet, with five purifiers; and No. 3, 3,822 feet, with six purifiers to pass through every foot of area. It is very probable that the small area employed is detrimental, in the latter cases, to economical purification, though it is quite possible to have too large an area, which might result in the lime being only partially spent, in consequence of the gas finding a too free passage through the material. The quantity of lime used will compare not unfavorably with other results that have been published, where the sulphur compounds are maintained at an equally low standard. If the small areas employed at the South Metropolitan works were unequal to the quantity of gas, the results of the summer working should show a great improvement as compared with winter time; but this has not yet been clearly proved. An area giving 2,000 feet of gas for every superficial foot in each box, which equalz 500 feet area in each box for every 1,000,000 per diem, would seem to be ample. In fact, the writer would be very pleased to have 400 feet area per million per diem, which would reduce Mr. Newbigging's constant to .4.

The depth of a purifier cannot be economically increased much beyond the usual 5 or 6 feet of ordinary practice, as the layer which first encounters the gas would be thoroughly spent before the last layer had done its fair share of work, except in the case where the lime is thoroughly carbonated before being taken out, and consequently all impurities are driven forward but that one.

In conclusion, it is not wished to claim for the three methods of purification described that they or any one of them are the best under the circumstances for the removal of the sulphur compounds, though when the comparatively small areas in use are taken into account, the charge per ton of coal is certainly not high.

It is possible that the descriptions of working here given may be useful—if not now, at some future time, when some further restrictions as to purity may be imposed. It is not an interesting subject, especially to those not troubled with this mode of purification; so that a little indulgence must be granted to the writer, who has endeavored to treat the matter as briefly as is possible under the circumstances.

Lime Purification for the Half Year Ended December 31, 1882.

Example.	Coals Carbonized. Tons.	Lime Used.		Labor.	Hill's Process. Fuel, Labor, and Royalty.		Total Cost, Exclusive of Removing Lime.	Removing Lime.	Tons Coal Purified by One Yard of Lime, Unslaked.	Feet of Gas Passed per Foot of Surface per 24 Hours.
		Yards Unslaked.	Cost.							
No. 1.....	31,338	807	£282	£352	.....		£634	£52	33.83	3200 (Sulphide Boxes)
per ton.....	.....	.....	2.15d.	2.69d.	.....		4.84d.	0 39d.	.....	.....
					Royalty.	Fuel and Labor.				
No. 2.....	80,902	2313	£517	£517	£168	£370	£1,864	£239	34.97	3304
per ton.....	.....	.....	2.4d.	1.53d.	0.49d.	1.1d.	5.52d.	0.709d.	.....	.....
No. 3.....	34,967	1390	£486	£421	.....		£907	£133	25.15	3822
per ton.....	.....	.....	3.31d.	2.88d.	.....		6.19d.	0.91d.	.....	.....
Anderson	.....	.....	.....	.....	.....		.....	.....	.....	1250
Do.	.....	.....	.....	.....	.....		.....	.....	.....	1931
Newbigging's rule	.....	.....	.....	.....	.....		.....	.....	.....	1666

NOTE.—One yard of flame lime weighs 10 cwt.; when slaked it measures 2 yards 3 bushels, and weighs about 1 ton.

Discussion.

Mr. Harris (Bow) listened with particular interest to the very able paper presented by Mr. Frank Livesey, and a paper coming from him on such a subject possesses exceptional valve, inasmuch as it has been necessary for him to devote special attention to the question of eliminating the sulphur compounds, as distinguished from sulphuretted hydrogen, from coal gas. They were aware of the exigencies under which he and one or two more labored of having to reduce the sulphur compounds to a very low figure indeed. Mr. Livesey, during the past few years, had had a special compulsion put upon him to reduce these compounds, and the difficulty was pressed upon his own shoulders nearly 20 years ago. Mr. Livesey had described several of the methods by which the sulphur compounds were reduced, but the principle underlying the whole of them was that of removing the sulphur compounds by means of sulphide of calcium. The different methods he had described had simply been different arrangements of apparatus to effect the same object, and in his (the speaker's) own apparatus he still adopted the method that he brought into use in the year 1866 or 1867. His practice has been to make use of two purifiers containing lime, and three purifiers containing oxide of iron. The effect was that, without taking particular notice of carbonic acid, he was able to reduce the sulphur compounds down to as low as from 9 to 12 grains. He had continued to use the system he originally adopted, because he found it very efficient, very simple, and, as far as he had been able to ascertain, as economical as any other system in use. He described with some minuteness his own process, and with regard to the quantity of gas purified per yard of lime, as explained by Mr. Livesey, it struck him that this matter required some further consideration, and various coals required different quantities of lime to produce the same results. For the last two years he had been working with two particular kinds of coal. The result was that he was enabled in one instance to purify the gas from about 25 or 30 tons of coal by one yard of lime; and in another instance he was enabled to purify from 15 to 20 tons of coal by the same quantity of lime, the reason being, in the latter case, that the lime contained so much larger proportion of carbonic acid that it practically became exhausted. Therefore the results must not be taken as an absolute test of the value of a process with a given quantity of lime, unless it was known that the coal used by both processes was the same.

Mr. G. B. Trewby (Gas Light and Coke Company) after alluding to the importance of the paper, could quite believe Mr. Livesey when he said that the processes required watching. In his own case the necessity for watching existed not only from day to day, but from hour to hour. The plan he adopted was to have eight purifiers in succession. They kept them at work for 5,000 hours, the great bulk of the lime being used for carbonic acid. He reckoned that in the plan he adopted fully 80 per cent. of the lime was used simply for the removal of carbonic acid. Very little sulphur compounds were taken out from the first purifier. On the average there was about as much crude gas coming out of the first purifier as when it entered. Mr. Livesey had not given the amount of sulphur compounds he had to deal with in the crude gas. From the series of experiments made from the kinds of coal he had in use, he got sulphur compounds varying from 35 to 50 grains in the 100 feet, and of course that necessitated very careful purification. In reference also to carbonic acid, Mr. Livesey did not give the percentage in the crude gas. With reference to the actual cost, he would ask Mr. Livesey to be kind enough to explain how it was arrived at.

Mr. Alderman Moscrop said—Mr. Frank Livesey has given us the superficial area of one purifier; will he kindly state, approximately, the aggregate superficial area in feet per each million feet of gas required for the most efficient and economical purification of the gas from carbonic acid, sulphuretted hydrogen, and other sulphur compounds.

Mr. Carr (Halifax) asked Mr. Livesey if he put the lime into the purifiers in a dry condition, or went to the expense of putting it in in a very wet condition. That was a matter on which a great variety of opinions must exist, and it would be very interesting to have Mr. Livesey's opinion upon it.

Mr. Hardie (North Shields) gave the results of a process of purification working with alternative oxide of iron and lime.

Mr. John West (Manchester) asked if Mr. Livesey had taken into consideration and allowed for the value of the spent oxide, oxide now being a very valuable product.

Mr. G. Livesey (London) rose to utter a protest. He had always said, and further experience confirmed it, that all this talk about sulphur compounds was a piece of the greatest humbug. The best plan was to adopt the system in force at Birmingham, Leeds, Manchester, and other sensible corporations, of having one set of purifiers. It saved managers a great deal of trouble, and the public were quite as well satisfied.

Professor Wanklyn condemned as absurd the legislation that had taken place as to sulphur compounds, and believed it was effected by something very like a fraud.

Mr. Folkard wished to know what description of coal was used in the experiments, because some kinds of coals gave only 28 grains, and others, such as Silkstone, gave 40, which made twice as much work for the sulphide purifiers.

Mr. Livesey, replying to the remarks made in the discussion, said he had only described processes with which he was thoroughly acquainted, and it must be understood that those three processes were described on their relative merits. They were not compared with the use of other kinds of coal or methods of purification, but were meant as a help in the selection of a better way of purifying gas under these restrictions. The coals used in the three cases were similar—good Durham gas coals. The carbonic acid in the crude gas was 1.5 to 2. As to the lime, he had taken the standard price in the three cases. It would vary a little, but he had taken 7s. With regard to another remark, he said he thought Hill's process would come up to 40 tons of coal purified by a yard of lime; and as to area of purifiers, he recommended 500 feet to each purifier for every million feet of gas made per diem. In conclusion, he said the three processes formed a comparison, under exactly similar circumstances, with similar coal and lime; and he thought the result was a fair comparison.

The President said Mr. Livesey's method of showing the relative advan-

tages had been very clearly demonstrated. A reference had been made by one of their distinguished members to a matter which he could not allow to pass without comment—namely, the removal of sulphur compounds. This removal of sulphur compounds had been a very considerable amount of trouble in past years; but it was a legislative enactment now to meet the times, and it was their duty to discover the best and cheapest method of accomplishing that object. Mr. Wanklyn's efforts in that direction had been very valuable, and it had been demonstrated that with proper plant sulphur compounds could be removed in considerable quantities at no very great cost. Further improvements would, he thought, enable them to be removed at no cost whatever. With the sulphur compounds removed, there was no doubt that they had a better gas for general purposes than they had with them in.

The Flow of Gas Through Pipes.

The *Journal fuer Gasbeleuchtung*, some months ago, discussed editorially the absence of reliable experiments on the loss of pressure in the delivery of gas through pipes, and pointed out the necessity of thoroughly investigating these losses. It appears that the first experiments on the subject were made by MM. Girard and D'Aubuissan. The pipes upon which Girard experimented were simply a series of gun barrels joined together in a defective manner; and hence his data cannot be applied to the system of pipes such as are in use to-day. D'Aubuissan, on the other hand, experimented upon pipes 4 inches in diameter, and hence his results may be said to better meet modern requirements. He neglected, however, to note the volumes and velocities which determine the constant or coefficient of his formulæ, and deduced his velocities by calculation from the pressures allowed; hence his results have been of doubtful accuracy.

Later experiments, by Clegg, Mayniel, and Arson, on this subject, raised doubt as to the accuracy of these early observations, so that Arson finally applied himself to the task of working out new formulæ and tables as the result of a series of carefully made experiments, displaying great accuracy and skill, and using the best of instruments of precision. The pipes upon which these experiments were made varied in diameter from 4 to 10 inches, and had a length of about 875 feet. Nevertheless, the slight errors which cannot be avoided in experimenting on short lengths of pipes become appreciably greater where it is attempted to apply the formulæ to the case of longer pipes, and the necessity of experiments on a large scale is therefore evident.

For this reason M. Salanson, engineer of the gas works at Nimes, France, made an elaborate series of experiments, which he communicated to the Société Technique de l'Industrie du Gaz en France, and which have every claim for accuracy. The stations and shops of the Paris and Lyons Railway, at Nimes, have a separate line of pipe which supply them with gas directly from the gas works; for a distance of 2,650 feet this pipe is 10 inches in diameter; it then branches out into two pipes, one of 4 inch diameter and 1,200 feet in length, supplying the freight depot; the other, 8 inch diameter and 9,900 feet long, supplying the workshops. The pipe is ordinary spigot and socket cast iron gas pipe, jointed with lead.

Two series of experiments were made. In one, the delivery and loss of pressure were ascertained by using the main pipe and the larger of the two branch pipes; and in the second, the trunk line, with the small pipe, were employed. The experiments were made as follows: Three observers and their assistants were so stationed that one took the observations at the gas works, the second at the junction of the three pipes, and the third at the outlet end. Each station was provided with a barometer, two thermometers (one of which served to ascertain the temperature of the gas in the pipe), and a delicate pressure gauge. At intervals of half an hour three experiments, each of five minutes duration, were made. Five minutes previous to every experiment a signal was sent out from the gas works, by suddenly disturbing the governor; the observer at the end station then opened a valve and allowed a definite quantity of gas to flow out; this was measured by a meter of 150,000 cubic feet daily capacity at the gas works. Observations of all instruments were simultaneously made at all stations.

The results of the experiments were as follows:

Experiment on Four-inch Pipe.

Mean temperature of gas, 65° F.; mean barometer, 29.92; difference due to level, .393.

Rate of Delivery. Cubic feet per hour.	Loss of Pressure in inches of water, not corrected.	Loss of Pressure in inches of water, corrected.
1,228	.078	.468
2,096	1.100	1.493
2,633	2.004	2.397
3,671	3.998	4.391
3,819	4.205	5.198
3,671	4.048	4.441

Experiment on Eight-inch Pipe.

Mean temperature of gas, 64° F.; mean barometer, 29.65; difference due to levels, .286.

Rate of Delivery. Cubic feet per hour.	Loss of Pressure in inches of water, not corrected.	Loss of Pressure in inches of water, corrected.
2,188	.039	.325
3,431	.235	.521
4,454	.589	.875
5,577	.904	1.189
6,808	1.411	1.697
8,006	2.043	2.329

It was necessary to make the following corrections: The station meter was compared with a 50-light meter, which had been carefully proved; it was found that it registered 1.65 per cent. faster than the test meter, which itself was 1.55 per cent. fast. The actual observations at the station meter were therefore divided by 1.032. Corrections were also made for leakages in the pipes; it appeared that the loss amounted to 38.8 cubic feet in the 8-inch pipe, and 62.5 feet in the 4-inch pipe. These observations were made before the corrections for the inaccuracy of the station meter were considered. The correction for temperature and atmospheric pressure was made according to the well-known formula.

Nine tests for the specific gravity of the gas were made, and it was found to be .371. The ordinary Bunsen diffusion apparatus was used. The loss of head through friction depends upon the pressure. In the following comparison of the results of Salanson's experiments, with the data obtained from Arson's tables, the former were multiplied by $\frac{410}{317}$, 410 being the specific gravity of the gas in Arson's experiments.

Four-inch Pipe.

Delivery of Gas. Cu. ft. per hour.	Loss of Head in 3,250 feet, as per Salanson.	Loss of Head, as per Arson.	Difference, inches of water.
1,059	.636	.931	—.295
1,850	2.027	2.204	—.177
2,336	3.248	3.234	+.014
6,809	5.981	5.816	+.165
6,943	6.249	6.186	+.063
	Eight-inch Pipe.		
1,944	.089	.087	+.002
3,064	.188	.216	—.028
4,080	.317	.359	—.042
4,998	.431	.522	—.091
6,290	.616	.727	—.111
7,190	.843	.915	—.072

No loss of pressure was noticeable in the 10-inch pipe. The difference in level between the works and the junction is a little over 3 feet. With the maximum gas delivery, the loss of head was only .04 inch, while Arson's formula would indicate .25 inch. It follows, therefore, that for 4 and 8 inch pipe Arson's tables are practically correct; no so, however, in the case of the 10 inch pipe, upon which further experiments should be made.

Protecting Iron Against Rust.

An English writer says that it is still an open question how best to protect iron against oxidation, commonly known as rust. He who would find an effective preservative would indeed be a benefactor, for by its means numerous noble structures, in which the tooth of time is now eating slowly but surely, would be preserved to posterity. It is well known that wherever air and damp come into contact with even the smoothest iron surface rust soon makes its appearance. By its operation not only is there a constant waste going on, but the remaining iron is rendered brittle. A coating of less oxidizable metals, such as tin, later lead and zinc, and quite recently nickel, has, therefore, been applied, and with some effect. Earthy glazes, such as are applied to pottery, have also been used for coating iron vessels for household purposes. But all these coatings of metals or glazes have been found in most cases either impracticable in application or too expensive. For extensive use, coatings consisting of oils mixed with metallic oxides, earths, etc., have thus come into use.

Now, it has been observed that iron does not rust in dry air, even in dry oxygen. Iron, also, frequently does not suffer when exposed, without being painted, to the open air—weather-cocks, fences, etc., having lasted for centuries. But in that case it has been found that they have been protected by the formation of a thin layer of peroxide of iron, which has acted as a safe covering against exterior influences. This experience led to the artificial production of a layer of magnetic oxide, superheated steam being used for the purpose. It is not to be supposed that such a treatment will find extended application; and a protective covering obtained in this way would only be effective

in the case of iron in pure air, but not where it comes into repeated contact with water or carbonic acid. An interesting phenomenon has likewise been observed on railways. It has been found that iron sleepers and spikes rust very much if the line is not used for some time. It is assumed that iron bodies are more liable to rust in a state of rest than if they are exposed to vibration from time to time, in which case, perhaps, an electrical effect comes into play which lessens the affinity of iron to oxygen.

In demolishing old buildings, there are often found iron cramps, blocks, etc., which, so far as they are surrounded by mortar, are completely free from rust, just as if they had only left the forge. A similar phenomenon has been met with by M. Vicat, a French engineer, when he had the anchor fastenings of several suspension bridges exposed which had been put down thirty years before. Where the iron in the masonry was surrounded by rich mortar, there was not a sign of the formation of rust, whilst the continuations of the anchors in hollow spaces were rusted to such a degree as to have lost two-thirds of their former dimensions. It has been frequently observed that iron does not oxidize in water if small quantities of caustic alkalies, or alkaline earths, are solved in it, in which case acids of whatever nature would be excluded. It appears that the above experiences have served as the basis for the rust protective paints invented by Herr A. Riegelmann, of Hanau (Bavaria). He adds to his paints caustic alkaline earths, (barytes, strontian, etc.) By coating iron with them, it is said to be in the same state as the anchors of suspension bridges in lime mortar. Although simple coatings of such paints, owing to their slight thickness, cannot contain much alkaline matter, as is the case in walling in iron, alkaline effects will show themselves as long as they contain a certain percentage of it. But in any case those paints are free from active acids, which cannot be said of all our paints for iron. Should the paint be found in practice to possess the protective properties claimed for it, a step in advance would have been taken in the preservation of iron, and its greater application would be ensured.

The Buffalo (N. Y.) Electric Street Lighting Scheme Vetoed by Mayor Manning.

Mayor Manning, of Buffalo, N. Y., presented to the Buffalo Common Council, at its meeting in August, a veto of the action of the Aldermen authorizing the Comptroller to contract with the Brush Electric Light Company to light certain streets of the city with electricity. It is particularly gratifying in these days of corrupt, degenerate and extravagant systems of municipal government, to consider that some exceptions to the rule may be still found; and more than pleasing to us to be enabled to place upon record the reasons, clear and cogent, given by Mayor Manning in sustaining the position taken by him in this matter.

The electric lighting craze appeared at one time to have taken a firm hold upon the affections of the solons at the head of municipal affairs in certain cities in the interior of this State; and some of these places find themselves burdened and harassed with lighting contracts which they would very much like to cancel. Buffalo's Mayor has given the subject cool and calm consideration, arriving at his determination on grounds which admit of no other interpretation than that they were solely for the best interests of the municipality of which he is the official head. The document is as follows:

"I return without my approval the following resolution adopted by your Honorable Body, on the 23d of July, viz.:

"That the Comptroller be and is hereby authorized and directed to contract with the Brush Electric Light Company for lighting certain named streets with electric light from August 1, 1883, to August 1, 1884, at their bid of 55 cents per lamp per night; lights to be placed subject to the order of the Gas Inspector; also that the gas light companies shall discontinue all lamps in street crossings of a distance of 200 feet where electric lights are placed on the corners; the city reserving the right to discontinue any or all lights at any time during the term of said contract, and in case of failure of any electric light to burn the full time, pro rata reduction shall be made for the time said light fails to burn.

"On the 11th of May last you adopted a resolution authorizing the Comptroller to contract with the electric light company to light certain streets therein named. This resolution was returned without my approval, and I think no subsequent action was taken upon it. In the authority contained in the foregoing resolution of July 23, the same streets are included, and in addition thereto the Comptroller is authorized to contract with said company for the lighting in whole or in parts of thirteen other streets.

"In my communication of May 28 last, I stated somewhat at large some reasons why I could not yield my assent to the said resolution of May 14. The reasons apply with equal force to the resolution above set forth. I will not trouble you with a re-statement of them now, but respectfully bespeak for them at your hands a careful review and re-consideration. In regard to the last resolution I beg leave to make some additional suggestions. The streets named in it to be lighted instead of being 4½ miles in length as stated in my said communication are according to a computation of the engineer 65,700 feet, or over 12 miles exclusive of parts of streets now lighted by electric light and the sum proposed for each electric light per night instead of 65 cents as at first proposed is now to be 55 cents. But I am satisfied that does not substantially change the position heretofore taken by me as to the comparative cost of gas and electric lights. In my said communication I stated that the difference in favor of gas was more than 55 per cent.; and on further examination and from the best information I have been able to obtain, I am confirmed in that conclusion.

"As I learn from the parties concerned, it is not disputed that the interval between electric lamps should be 400 feet, and that the usual and proper intervals between gas street lamps should be 125 feet. There may be some exceptions to this rule, but the average distances are, as I am assured, as here stated. Different theories of computation have been adopted, but here is a basis of simple, ascertainable facts, viz: The number of electric lights to be furnished in a given district and the number of gas lamps in the same district. These being ascertained, there is no longer any question as to the comparative costs. It thus appears:

"Whole distance of streets to be lighted 65,700 feet. Divide this by 400 feet, the intervals between the electric lights and gives the number of lights at 164.

"Cost of each electric light per year, $200.75.

"One hundred and sixty-four electric lights at $200.75 gives the total cost per year $32,923."

COST OF GAS.

"Divide the whole distance as above stated by 125 feet, the interval between the gas lamps and it gives the whole number of lamps 526.

"Five hundred and twenty-six gas lamps at $26.45 each per year as proposed by the the gas companies, $13,912."

Comparative Cost Per Year.

Electric light	$32,923
Gas lamps	13,912
Difference per year	$19,011

"I have given this matter the most careful consideration, and I am confident that the above is as nearly correct a statement as it is practicable to obtain. It is based, as will be seen, upon the number of electric lights and gas lamps actually to be used and cannot be changed by suggestions founded upon mere speculation and conjecture; and it is but the comparative expenses of these two modes of lighting to public streets. Should you have any doubts about this statement, it might be well for you to make such inquiry as to satisfy yourselves of its character. In your resolution of May 14, which was disapproved by me, you provided for lighting a certain district at an expense of over $9,000 more than it could have been lighted for with gas, and now as your comment on the reasons given for disapproving the resolution you have adopted another resolution describing another district which you provide for lighting with electric lights *at a cost of nearly* $20,000 *more than it could be lighted for with gas!* and though the district is confined mainly to a particular part of the city, this large sum would under the provisions of the city charter, virtually have to be raised by a general tax on the whole city; so that this is a question which affects all the property owners in the city, and it will be for you to determine how far your project of lighting these remote streets with electricity will meet the approval, not of any particular ward or locality, but of every ward and every part of the city. I am not advised, gentlemen, of the reasons controlling your action in adopting your resolution, nor can I even conjecture what they may have been. With a certain few exceptions all the lighted parts of the city are with gas, and this has generally been found quite sufficient for the needs of the public. You have now authorized the lighting with electricity (in addition to streets already so lighted) of more than twelve miles of streets, along more than six miles of which, as I am informed, no gas pipes have been laid. With most exceptions these are outlying streets mostly in very thinly populated districts, and some of them being hardly more than country roads. Yet you propose to light all these at *a rate of expense more than double that of lighting the most densely populated portions of the city!* If there is any reason for this it would doubtless satisfy the taxpayers of the city that they should be informed of it. Nor do I think that the people along some of these streets would be greatly pleased to have this project thrust upon them. As to such streets as Broadway and Genesse street the inhabitants along them would not fail to petition for this costly light if they desired it. It would be the same with the people on the other streets. Yet so far as I can learn not a single such petiton has been presented as to any of the streets, and I am not aware that any evidence has been furnished of the existence of such desire. This is significant of the little support which will be received from the great mass of taxpayers for this project authorized by your resolution. As to placing gas in streets not now lighted, the situation is the same as at the time of my said communication of May 28. All the gas companies have given ample assurance in writing that they will extend their gas mains as your honorable body shall direct, specially including all the streets desig-

nated by you to be lighted. While referring to the manner in which the resolution would affect the interests of the city I should not omit to call your attention to the fact that if it should be carried into effect the gas companies would be relieved from furnishing gas at the price proposed, viz.: $26.45 per lamp. The price then would doubtless not be less than at present, viz.: $28.74 per lamp. Computing all difference between these amounts as the number of lamps in use will show the sum of $11,450. The city will be a loser to that amount; and adding this sum to the above mentioned difference of $19,011 it will appear that the annual loss to the city, by carrying your resolution into effect, would be the sum of $30,461. In addition to the question of expense there is an advantage in lighting with gas the streets not now lighted which should not be overlooked. If the streets are so lighted, gas could be furnished at the same time for private consumption. If lighted with electric light the inhabitants would have no prospect of a supply of gas for domestic purposes, as no company would lay gas mains in the streets unless also for the purpose of lighting the streets.

"On no conceivable ground, gentlemen, could I justify myself to the taxpayers of the city in giving my assent to your action, and I cannot believe that on further and more mature consideration you will be convinced that this action should not be confirmed by your honorable body.

"I think there can be no difficulty in properly and satisfactorily disposing of this matter. I have the proper assurance of the gas companies that their proposal as to the price of each lamp should be binding as to all parts of the city, excluding the district at present lighted by electric lights, and that if such district shall continue to be lighted as at present the gas companies will furnish gas for all other parts of the city at the price proposed."

JOHN B. MANNING, Mayor.

Electricity as Applied to the Lighting of Coal Mines.

At the recent Liege meeting of the Institution of Mechanical Engineers, Mr. Alan C. Bagot, M. E., of London, read a paper on the "Application of Electricity to the Working of Coal Mines." The author, in the first section of his paper, paid attention to some of the various uses (such as signalling, etc.,) to which electricity is put in underground operations, and the second portion of the article was devoted to the consideration of the question of the application of electricity in mining for illumination and for transmission or storage of power. The author stated that in 1881 he experimented at length on the illumination of the pit bank and screens at Harris's Navigation Collieries. A Gramme dynamo machine was driven off an engine that worked a Schiele fan, thus ensuring great steadiness of motion and economy in motive power. The result of the experiment showed that incandescent lamps were useless, and powerful arc lamps, fixed at 40 feet above the ground, the most suited for the purpose. On account of the absence of color in the light, the coal trimmers could pick off brass and pyrites quicker by the arc lamps than by incandescent lights. In every way the experiments proved conclusively that electric illumination of the surface was desirable at a mine of any great magnitude, and that the ordinary engineers staff of a colliery was capable of maintaining the appliances in operation after a week's instruction; but it was generally agreed that the introduction of alternating high tension current machines was very unadvisable on account of the likelihood of accident to the men. For underground illumination electricity appears to be altogether inapplicable. Mr. Bagot remarks that at the Risca Collieries the electric light is introduced into the pit from a dynamo machine driven at the surface. The cable is taken down the shaft, and connected with a series of Crompton incandescent lamps of large size at the bottom. These give an excellent light, and facilitate very greatly the work of the cagers and the men in the gate roads. But as regards the introduction of such lights into coal mines for the purpose of illuminating the working stalls and faces, there are serious obstacles. It must be borne in mind that with safety-lamps a constant watch is kept on the appearance of gas. Now, a blower of gas has been known by the writer to back up against an air current of 65,000 cubic feet per minute passing down the split, and with electric lamps no notice would be given of the fact. Such accidents—or again, a fall of roof breaking a wire, or the breakage of a lamp—cannot be guarded against; and hence the writer is of opinion that no increased safety would be afforded by the electric illumination of the working faces from dynamo machines. The danger of breaking lines may, indeed, be avoided by the use of accumulators or secondary batteries, charged at the surface from a dynamo machine. But it is stated that 30 Faure accumulators, weighing in all about three tons, were required to illuminate by means of incandescent lamps the Pullman express on the London, Brighton, and South Coast Railway between Brighton and London. Hence the applicability of such batteries in their present state to coal mines seems very doubtful.

THE light in the new Tampico (Mex.) lighthouse is a dioptric white light of the second order, triple flash, 30 seconds duration, visible 28 nautical miles.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

INDOORS AND OUTDOORS.—The National Association for Sanitary and Rural Improvement, Hon. Erastus Brooks, President, the objects of which body are "to establish local societies for sanitary and rural improvement; the issuing of tracts, and the holding of annual conventions for discussion and conference," are publishing a monthly journal, styled "*Indoors and Outdoors.*" The Editors are Charles F. Wingate, Sanitary Engineer, and John Y. Culyer, C. E. The cost of the new journal is but 50 cents a year, and the office of publication is at 119 Pearl street, New York city.

SEEKING TO ENJOIN THE ST. LOUIS GAS, FUEL AND POWER COMPANY.—The St. Louis Gas Light Company, St. Louis, Mo., through its President, Mr. R. J. Lackland, filed an injunction suit in the Circuit Court, on Saturday, August 11, against the St. Louis Gas, Fuel and Power Company. The object is the same as in the *quo warranto* proceeding instituted on the 30th of July last by the Attorney General, but the grounds are in many respects entirely different.

BORROWING MONEY.—A certificate was lately filed in the County Clerk's office, New York city, showing that the holders of $854,300 of the stock of the Brush Electric Illuminating Company had consented to the property and franchises of the corporation being mortgaged to secure the payment of $300,000 of 6 per cent. bonds, which are to be issued immediately, and to be made payable in 1893. Is not this a pretty stiff rate of interest, when money can be had in almost unlimited amounts at 4 and 5 per cent., provided the collateral security is good? We do not wish it to be inferred that the Brush collateral is not all right; but why pay 6 per cent. for accommodation that might readily be obtained at 5?

THE WESTINGHOUSE ENGINE.—The Jersey City Gas Light Company, Jersey City, N. J., is experimenting with a new exhauster, which requires very little power. It is being successfully driven by a 4×4 Westinghouse, speeded at only 200 revolutions, and developing not over one-horse power.

WATER FOR NEW LOTS, L. I.—A corporation known as the Long Island Water Supply Company have a contract to supply New Lots with water. The works are being rapidly pushed forward by the contractors, Messrs. Freel and McNamee, and it is expected that within the next 60 days a supply of pure water will be flowing through the town.

THE GAS GOES OUT AT CONEY ISLAND.—Shortly after dark, on the evening of August 23, the gas lights at West Brighton Beach, Coney Island, became extinguished. At the gas works it was stated that an accident had happened to the holder, which it was hoped would be remedied in 24 hours. Lamps had to be substituted in a great many places. In fact, the only establishments which did not suffer from the extinguishment were the Brighton Beach, Manhattan, and Oriental Hotels—these mammoth caravansaries being equipped with huge gas machines.

GAS TO HAVE A CHANCE TO SHOW WHAT IT CAN DO.—The Consumers' (Toronto, Can.) Gas Light Company intends to exhibit at the coming session of the Toronto Industrial Exhibition, to be held on the days embraced between the dates of the 17th and 22d of September, a complete variety of lamps, burners, heating and cooking stoves, gas engines, and other appliances and apparatus. The officials of the Consumers' Gas Light Company have wisely concluded that such an exhibition will be the most certain means of affording the people of that city an opportunity of seeing demonstrated in a practical manner the advantages of gas for lighting, cooking, and heating, as also its utility as a source of motive power. It is intended to exhibit specimens of the Bray, Sugg, and Siemens lamps and burners, of from 1,000 candle power downwards; and it is hoped that an example of the Bower-Grimston burner will be ready in time to be also numbered among the exhibits. Mr. W. H. Pearson, Secretary of the company, and to whom the credit of organizing the proposed display should be given, furnishes the following particulars:

"The best cooking stoves to be obtained will be exhibited in practical operation, as well as the gas engines—which will include the Otto Silent, Bisschop, Turner, and London, the last three being of from one to five-man power. Amongst the other apparatus will be a Sugg-Letheby photometer, Sugg's illuminating power meter, burner provers, hot-plates, iron heaters, etc.

"A portion of the main building will be lighted by gas, and a portion by electricity—one 1,000-candle Siemens suspension lamp being placed in the center of the building. In the grounds will be placed one each of the Sugg, Bray, and Siemens largest specimens of lamps, opposite to an equal number of electric lights at some distance away, so that gas will come into direct competition with the so-called 2,000-candle electric lights, thus enabling the public to judge between the two systems of illumination, and I have no fear as to the ultimate result.

"We have also arranged to light a section of one of our principal streets with Sugg's 60-candle "Whitehall" lanterns, and another section with Siemens 130-candle lanterns, the idea being to demonstrate that more effective and economical street lighting can be obtained from gas than from electricity.

"Our company have spared no expense to make this exhibition as effective as possible; and although it cannot be expected that this effort of one company alone will equal exhibitions of a similar nature, held in other countries and gotten up by the combined efforts of a number of gas companies and manufacturers, yet I may beg leave to say that there will be contained enough features of interest to make it worth while for our friends in the gas business, who may be located within a reasonable distance of Toronto, to inspect it. This last applies to those who may not have had the opportunity of seeing similar exhibitions on a more extended scale; while, at the same time, a visit to the "Queen City of the West" would prove a source of interest and pleasure to those who may not have been there before. I, of course, have not given anything like a detailed account of our exhibit, but may mention that it is intended to have a card attached to each article exhibited, showing the quantity of gas consumed per hour, and the cost of the same at the price charged by the company."

The Toronto company certainly sets an excellent example, which we would like to see followed up in other places. The outlay attending such a display will be returned more than a hundred times; and if for no other reason, sound business policy will dictate that this is the proper course to pursue. We most heartily wish the Toronto exhibition every possible success.

A Large Engine.—An enormous engine has just been completed at the shops of the Holly Manufacturing Company, Lockport, N. Y. It was constructed at the order of the city of Columbus, Ohio, and is to be used for supplying water to the inhabitants of that place.

It is the largest and most powerful of this class of engines ever turned out by the Holly Company, exceeding in capacity of forcing by 2,000,000 gallons daily any previous engines made in these shops. The following figures show its magnitude: Capacity, 10,000,000 gallons in 24 hours; weight, 200 tons; weight of balance wheel, 10 tons; diameter of wheel, 16 feet; length of works, 20 feet 6 inches; width, 26 feet 6 inches; height, 11 feet to steam valve; stroke of cylinder, 18 per minute; horse power, 600, estimated.

Gas Companies Consolidated.—The Empire Gas Light Company, a corporation recently organized for the purpose of supplying the residents of New Lots (L. I.) with gas, has been consolidated with the old Union Gas Light Company, which has been in operation for some years. The founders of the new scheme have taken three-quarters of the stock, and have increased the capitalization from $50,000 to $100,000. Mr. Samuel Hatton, one of Brooklyn's prominent business men, has been elected president.

Destruction of the Empire Refining Company's Works by Fire.—On the morning of Wednesday, August 22, the works of the Empire Oil Refining Company, situated at Hunter's Point, near Dutch Kills, L. I., were destroyed by a fire, which originated in the packing department. The Empire Refining Company is a part of the system of the "Standard" monopoly. At about 10:30 o'clock on the morning in question, a man named Lewis, while soldering the lid on a can of oil, accidentally brushed the red-hot soldering iron against a sponge saturated with oil, with which his helper wiped the surface-oil from the can. In an instant the sponge was ablaze, and before the helper could dispose of it, the oil in some of the cans in the vicinity had ignited, and, like a flash of lighting, the fire spread through the building.

A thick brick wall, 30 feet high, separated the packing department from the tanks of refined oil on the south side of the yards, and this prevented the fire from spreading in that direction before the wind veered. Adjoining the packing department on the eastern side was the filling department, where the cans were filled with oil from three immense tanks. The tanks contained between 30,000 and 40,000 gallons of oil. When the fire reached them they exploded one after the other. The effect of the repeated explosions was appalling. The ground trembled for many blocks, and the high wall separating the packing department from the tanks was blown down. That part of the roof which had not already been burned was thrown high in the air, while sheets of blazing oil rose among the clouds of smoke and settled down again into streams resembling molten lava.

Several causalties occurred during the prevalence of the conflagration, but none were attended with fatal results. The Superintendent of the works estimated the company's loss at $200,000. The property destroyed, he said, consisted of 1,200 empty barrels, 2,500 barrels of oil, each containing 32 gallons; 150,000 empty cases, about 15,000 cases of oil, each containing 10 gallons, and 3 tanks containing between 30,000 and 40,000 gallons of refined oil. These tanks were in the filling department. Besides this inventory there were the buildings, which had been destroyed, and the pier, which was of crib-work and valued at $100,000. The latter was so thoroughly saturated with oil that it would continue to burn as the tide fell until the low water mark was reached. H. H. Rogers, of the Standard Oil Company, said the loss would not be more than $70,000. The buildings, he said, were "merely shells, affording a shelter." He said the property was insured by the Standard Oil Company's system, a sort of "self-insurance," and no outside companies would be losers by the fire.

The Parker Gas Engine.—Mr. L. C. Parker, of Robinson, Kansas, who, for the past three years, has been engaged in perfecting a gas engine, announces that the experimental stage has been passed, and that arrangements have been made with the Yonkers Manufacturing Company, of Yonkers, N. Y., to place the new engine upon the market.

Among the novel features of this engine is the auxiliary chamber, of which there may be one or several, located on the cylinder, and communicating with its bore by ports, which are covered and uncovered by the piston in its travel. Another and unique device is the igniter—the primary or firing charge is ignited by electricity; the current for this purpose being generated by a miniature dynamo, forming part of the engine, and operated from the crank shaft, the conducting wires being carried into the cylinder through insulators; at the proper time for ignition the circuit is broken by appropriate mechanism, instantly producing in the midst of the firing-charge an intensely vivid and powerful spark about as large as the head of a pin. In the next number of the Journal we will give a detailed description of the new motor.

New Light at the Lazaretto.—In about a fortnight there will be erected at the Lazaretto, a mast-head light for the guidance of small vessels coming up the Patapsco River, Maryland. The light will be red, similar to that in the Lazaretto lighthouse. The reason for placing this new light is that the tower light has been slightly obstructed by the erection of a large shed near by, thus rendering the flare invisible to small vessels sailing out of the main channels at certain points. Some time ago, General Babcock, lighthouse engineer to the Maryland district, consulted with the Brush Electric Light Company, of Baltimore, with the desire of ascertaining whether the said company could supply an electric light for the Lazaretto, from their establishment in Baltimore; but, as yet, no arrangement for the light has been made, nor could one be agreed upon until the consent of the lighthouse board is obtained. A report recently published, to the effect that General Babcock was negotiating with a view to supplying other lighthouses in the district with electric lights, is incorrect, since the General thinks that it has been clearly demonstrated that to supply isolated lighthouses with engines and dynamos for producing electric lights is too expensive a means of illumination to be entered into by the lighthouse board.

Mr. Edison to be a Business Man for a Year.—Mr. Thomas A. Edison is reported as having recently said the following to a representative of the New York *Daily Sun*: "I am going to be simply a business man for a year. I am now a regular contractor for electric light plants, and I am going to take a long vacation in the matter of inventions. I won't go near a laboratory. I have sold out my electric locomotive to a railroad company, who, I believe, are going to take up the thing and push it. At the expiration of the year I will renew my experiments at Menlo Park. The experiments will all be confined to electricity—no more phonographs or things of that kind. The more I think of that phonograph the more I am convinced that it would have been a terrible thing to set a machine at work recording all that a person said."

And the more we think of the manner in which the gas companies have been annihilated, since the introduction of the Edison incandescent lamps, the more ludicrous certain statements, made some *years* ago, now appear.

Electric Light for Arizona Mines.—It is stated that a number of mining companies in Arizona Territory are about to adopt the electric light, for the purpose of facilitating mining operations underground as well as on the surface. At the Silver King mine it is proposed to use four 3,000 candle power Brush lights above ground and two below, together with 25 small incandescent lamps. The dynamo located near the main shaft, will supply the current, descending 800 feet to the lower levels of the mine, to the arc lights and storage boxes, from which latter the Swan lamps are to be connected by small copper wires. Fixed lamps are to be suspended from the roofs of galleries, and the portable lights are to be attached to flexible conductors for convenience of shifting. These lights are to burn continuously, night and day. In the reduction works of this company both large and small lights are also to be used, a separate dynamo and two storage batteries supplying the current. The arc light circuit in the Silver King mine will be about half a mile in length.

The Steam Pipes Heard From Again.—At 7 o'clock on the evening of August 26, the firemen attached to engine company No. 4, located on Liberty street, between Nassau and William streets, New York city, were startled by

hearing a loud report, at the same time they saw clouds of steam issuing from the roadway at the corner of Liberty and William streets. The air was thick with steam, water, and mud; these being elements that the firemen were unable to cope with, word was at once sent to the office of the New York Steam Company that a rupture had occurred on its line of pipe. The violence of the explosion was such that huge paving stones were hurled upon the sidewalks—one large Belgian block passing through the window of E. L. Horsmans' large toy establishment, which building occupies the entire block on the east side of William street between Maiden Lane and Liberty street. The muddy water and steam poured through the broken window and extinguished the gas which was burning in the front part of the store. The accident was caused by a break in one of the steam supply pipes connecting with the store above named. Had the accident occurred at the same time on any other day save Sunday, it is difficult to see how loss of life could have failed to occur. A query which may very properly be propounded here, in connection with this explosion, is, "How many joints in the mains of the New York Gas Light Company were disturbed thereby?"

THE STOCK DOES NOT APPEAR TO SELL.—The Consumers' Gas Light Company, of Toronto, Canada, is threatened with opposition, in the shape of a body styling itself the "Excelsior Electric Light Company," the projectors of which are making the usual exaggerated statements as to candle power, cheapness, etc. As yet they have met with but poor success in getting the requisite $50,000 worth of capital stock subscribed, but have succeeded in obtaining permission from the City Council to erect poles for temporary use.

IMPROVEMENT IN THE CONNELLSVILLE COKE TRADE.—A review of the coke trade in the Connellsville (Pa.) region shows that during the past two weeks there has been a marked improvement in the coke trade. The strikes are over, and 900 idle ovens have been added to the active list. Of the 9,176 ovens in the region, but 1,263 are idle, as against 2,160 two weeks ago. This marked change is primarily due to the failure of the pro-organization strikes, and the return to work of the men at Morewood and McClures. In addition to this the Moyer works have resumed; the Charlotte furnace has received orders to fire up again, which puts in blast the ovens at Scottdale, as well as the Kifer ovens, and, in fact, the ore mines and all departments of labor so long idle. As against this, the strike for a restoration of the old wages at the Stewart works has shut down these ovens. The increased output has been met by an increased demand. There are no new furnaces starting up, but there has been an unusual demand from middlemen for transient trade. A short time since no less than 5,000 tons had been shipped, in one week, to dealers at Detroit, Buffalo, and Chicago, and very fair prices were obtained.

THE GAS LIGHT AND COKE COMPANY, LONDON.—In the report of the directors to the stockholders of this company we find the following:

"The company now holds land to the extent of 800 acres. Its manufacture is conducted at ten separate stations, most of them of great magnitude. The gas from these stations is supplied to very nearly the whole of London on the north, and also to a considerable district on the south side of the Thames. The annual quantity of coal used at all stations is more than 1¼ million tons. The yield of gas at present averages nearly 10,400 cubic feet from every ton of coal carbonized. There is no such thing as waste. Every residual has its value, and has become a recognized article of commerce. The total quantity of gas made last year was 15,000 million cubic feet, and the consumption of it continues to increase; a great impulse having been given by reason of the very general adoption of gas cooking stoves and heating apparatus, which are being let out by the company on hire. The greatest day's consumption of gas during the last winter exceeded 95 million cubic feet, and the quantity of coal used on that one day was no less than 9,250 tons, or at the rate of nearly 400 tons per hour."

PETROLEUM OIL IN WYOMING TERRITORY.—Mr. Wm. T. Lay, of Oil City, Pa., has just returned from a trip taken to investigate the newly discovered oil fields in Wyoming Territory. Mr. Lay states that the geological formation of the country in which the oil springs are located is identical with that of the Pennsylvania oil fields, and, from tests made by him, he is satisfied that there are vast reservoirs of oil beneath the surface at a depth of 1,000 or 1,200 feet, with a sufficient quantity of gas to send a stream of petroleum to the surface wherever a hole is drilled. In his opinion the extent of the oil-bearing territory is about 100 miles long by about 40 miles wide.

IMPROVEMENTS AT THE WORCESTER (MASS.) GAS WORKS.—Some changes and improvements are being made at the works of the Worcester (Mass.) Gas Light Company. When these works were originally constructed the exhausters were placed between the scrubbers and purifiers. This plan of arrangement has now been altered, and two new exhausters take the place of the old one formerly employed, the gas being taken directly from the hydraulic main and forced, under pressure, through the condensers and scrubbers. In making these changes it was necessary to take out all the old connections—the diameter of those substituted being 14 inches. The work has all been done under the supervision of J. H. Rollins, Esq., manager of the company.

PERSONAL.—Mr. D. Bruce Peebles, the well-known Scotch gas engineer, is at present on a visit to this country. He is one of the party of distinguished foreigners invited by President Villard, of the Northern Pacific Railway, to witness the ceremonies which are to take place at the "official opening" of this great example of railway engineering.

The Market for Gas Securities.

The market for city gas securities, during the past fortnight, has developed no features of interest to investors, changes in quotations being few and far between. The few recorded transactions show previous prices as being well maintained. Harlem gas is strong, and we also note the same state of affairs in regard to Manhattan. Brooklyn gas securities, despite the fact that "dollar gas" is still one of the features, are fairly steady, the stock of the old Brooklyn company being quoted at 110 to 115.

In out-of-town shares, Consolidated gas, Baltimore, Md., preserves the advance noted in our last, quite a number of shares having sold at from 44⅛ to 44½, our latest figures showing the bid price to be 44⅛, offered at 45. Advices from San Francisco, dated August 22, show that easier figures prevail at that point, San Francisco gas being 55½ to 57½; Oakland gas, at 28 to 29; Capital gas, at 56; while Central gas may be recorded at 48 to 50, which is a decided improvement. No other changes of note appear in out-of-town securities.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

How it Appears to "Observer."

NEW YORK CITY, August 23, 1883.

To the Editor AMERICAN GAS LIGHT JOURNAL:

If all signs do not fail there will be lively times ere long among the opposi- and old gas companies, in cutting rates, etc.

From the circular recently "thrown to the breeze" by the Chicago Gas Light Company, it is evident they are not going to quietly retire from the field, and leave it to the invaders. One dollar a thousand for 18-candle gas in Chicago, I venture to say, is lower than the most sanguine bear ever expected it; yet, that is the figure the opposition will have to "buck against" after the 1st of November.

In St. Louis, the Laclede has gone to $1.50, at which it will remain until the next move of the invader is made, and the Atlanta (Ga.) Company has gone to $2, and will probably remain there pending the decision of the question in court as to whether the City Council has the power to prevent the opening of the streets of the city without their consent—they having refused permission to the opposition company to do so.

At Savannah things are at a stand still, so far as the works of the new company are concerned.

The City Council refused to permit them to open the streets during warm weather or before frost, in the fall, which was quite a disappointment to the invaders, as they had given out that, before the year ended, they would have a works in every city in that section of the country where there was a company established that would not buy their patents.

If report is true this hint was not lost on the interested parties, and whether they build one or more works they will have difficulties to overcome not expected, or on their programme; for, I infer, none of the old companies will be allowed to drop by the wayside alone.

This is right, and the only wonder is that it has not been done before, both for the protection of the community and the established gas enterprises, since in no city, has an opposition works been started that did not result in an increase of capital far beyond what is necessary for the business, and the maintaining of a high price for gas to pay interest on the excess of capital.

Why the old companies do not retaliate, and fight opposition with opposition, I don't understand.

Good opportunities are numerous where consolidation, compromise or lease has taken place, on a basis of from $12 to $18 for each thousand sold during the year.

In the most of these places the judicious expenditure of $100,000, or so, would tap the cream of their business, and bring them to terms sooner than supposed; for the moment you interfere with the source from whence they draw the money to pay interest on their bonds you accomplish two things—*i. e.*, depreciate to their real value the bonds they have sold, and stop the sale of others for new operations.

In chasing the bear there is always fun for dogs until it turns on them.

"OBSERVER."

THE AMERICAN GAS LIGHT JOURNAL

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks (with W. B. Scott & co.,)

34 Pine Street, New York City.

September 3, 1883.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid	Asked
Central	$466,000	50	85	90
Harlem	1,800,000	50	100	—
" Bonds	170,000		—	—
Manhattan	4,000,000	50	230	235
Metropolitan	2,500,000	100	186	192
" Bonds	658,000	—	105	110
Mutual	3,500,000	100	116	120
" Bonds	1,500,000	1000	103	105
Municipal	3,000,000	100	182	185
" Bonds	750,000		102	104
New York	4,000,000	100	125	130
Northern	125,000	50	—	95
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	112	115
Citizens	1,200,000	20	69	73
" S. F. Bonds	320,000	1000	105	107
Fulton Municipal	1,500,000	100	75	80
Peoples	1,000,000	10	45	50
" Bonds	290,000	—	104	107
" "	250,000	—	88	90
Metropolitan	1,000,000	100	80	85
Nassau	1,000,000	25	50	60
" Ctfs	700,000	1000	90	93
Williamsburgh	1,000,000	50	73	—
" Bonds	1,000,000	—	100	.101
Richmond Co., S. I.	300,000	50	—	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	72	75
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	80	85
" " Bonds.	124,000	—	105	10
Chicago Gas Co., Ills			150	155
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			44½	45
" Bonds			105	106
Central, S. F., Cal.			48	—
Capital, Sacramento, Cal			—	56
Hartford, Conn	750,000	25	116	120
Jersey City	750,000	20	155	165
Laclede, St. Louis, Mo.	1,600,000	100	100	105
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn		25	152	160
Oakland, Cal			—	28½
Peoples, Jersey City			72	75
" " Bonds			—	—
Paterson, N. J		25	96	99
Rochester, N. Y		50	70	80
Washington, D. C	2,000,000	20	175	—
Wilmington, Del		50	174	—
Yonkers		50	33	35
St. Louis, Missouri	600,000	50	250	254
San Francisco Gas Co. San Francisco, Cal.			59¼	60

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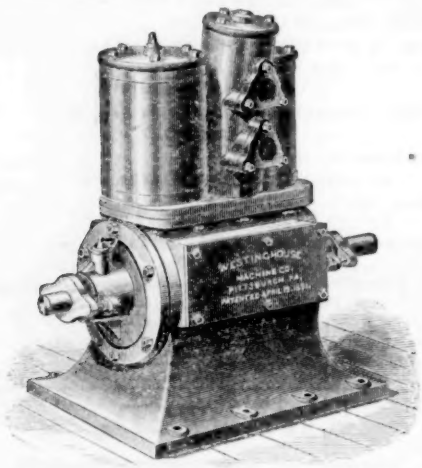

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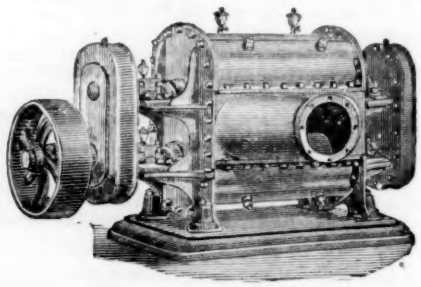

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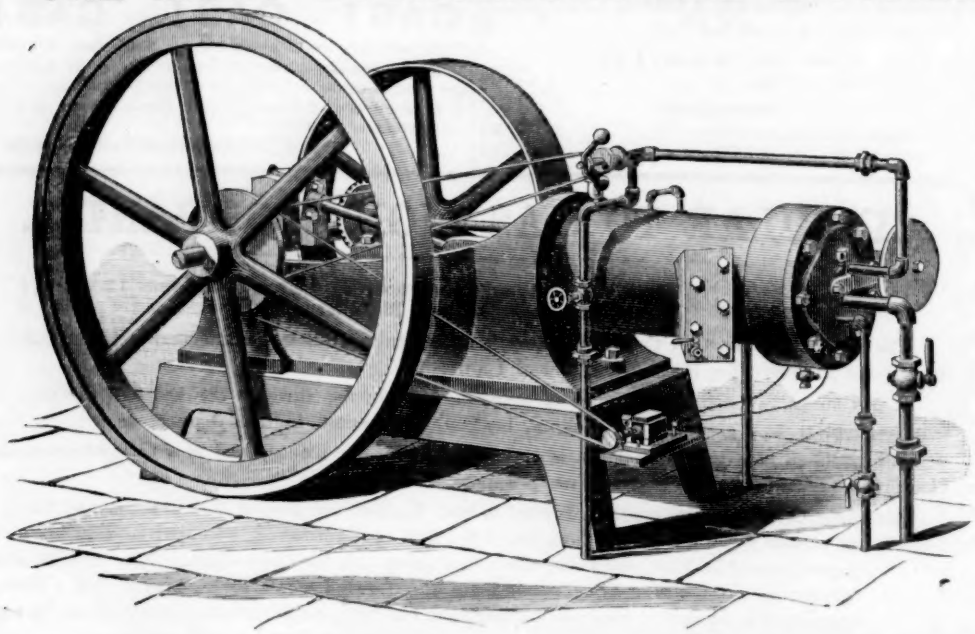

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